

**WHAT IS CLAIMED IS:**

1        1. A method of processing a packet comprising:  
2            populating a plurality of multi-feature packet processing rules in a multi-  
3                feature classification memory; and  
4            populating an associated content-addressable memory with a plurality of  
5                indices of said plurality of multi-feature packet processing rules in said  
6                multi-feature classification memory.

1        2. The method of claim 1, further comprising:  
2            identifying a classification of said packet; and  
3            using said classification to identify said multi-feature packet processing rule.

1        3. The method of claim 2, wherein said classification is based on a  
2        plurality of parameters of said packet.

1        4. The method of claim 2, further comprising:  
2            receiving said packet;  
3            finding a match for said classification in said associated content-addressable  
4                memory; and  
5            receiving one of said indices from said associated content-addressable  
6                memory for one of said multi-feature packet processing rules in said  
7                multi-feature classification memory.

1        5. The method of claim 4, further comprising:  
2            using said index to receive said multi-feature packet processing rule from said  
3                multi-feature classification memory.

1        6. The method of claim 4, wherein said content-addressable memory is a  
2        multi-feature content addressable memory.

1        7. The method of claim 4, wherein said content-addressable memory is a  
2        feature based content-addressable memory bank.

1       8.     The method of claim 7, wherein said multi-feature packet processing  
2     rules are populated in said multi-feature classification memory according to a feature  
3     hierarchy.

1       9.     A method of processing a packet comprising:  
2       identifying a classification of said packet; and  
3       locating a multi-feature packet processing rule in a multi-feature classification  
4       memory using said classification.

1       10.    The method of claim 9, further comprising:  
2       processing said packet according to said multi-feature packet processing rule.

1       11.    The method of claim 9, wherein said classification is based on a  
2     plurality of parameters of said packet.

1       12.    The method of claim 10, further comprising:  
2       receiving said packet;  
3       finding a match for said classification in a content-addressable memory; and  
4       receiving an index from said content-addressable memory for said multi-  
5       feature packet processing rule in said multi-feature classification  
6       memory.

1       13.    The method of claim 12, further comprising:  
2       using said index to receive said multi-feature packet processing rule from said  
3       multi-feature classification memory.

1       14.    The method of claim 12, wherein said content-addressable memory is a  
2     multi-feature content addressable memory.

1       15.    The method of claim 12, wherein said content-addressable memory is a  
2     feature based content-addressable memory bank.

1        16. The method of claim 12, wherein said multi-feature packet processing  
2 rules are populated in said multi-feature classification memory according to a feature  
3 hierarchy.

1        17. A packet processing rule lookup system comprising:  
2            a content-addressable memory; and  
3            a multi-feature classification memory coupled to said content-addressable  
4            memory, wherein said multi-feature classification memory includes a  
5            plurality of packet processing rules for a plurality of features.

1        18. A network element comprising the packet processing rule lookup  
2 system of claim 8.

1        19. The network element of claim 18, further comprising:  
2            a processor coupled to said multi-feature classification memory, said processor  
3            is configured to process a plurality of packets according to said  
4            plurality of packet processing rules.

1        20. The network element of claim 19, further comprising:  
2            a network interface coupled to said processor, said network interface is  
3            configured to provide input output interface for said network element;  
4            and  
5            a memory coupled to said processor, said memory is configured to store  
6            information.

1        21. The network element of claim 19, wherein said content-addressable  
2 memory is a multi-feature content addressable memory.

1        22. The network element of claim 19, wherein said content-addressable  
2 memory is a feature based content-addressable memory bank.

1        23. The network element of claim 19, wherein said multi-feature packet  
2 processing rules are populated in said multi-feature classification memory according  
3 to a feature hierarchy.

1        24. A network element comprising:  
2        means for populating a plurality of multi-feature packet processing rules in a  
3        multi-feature classification memory; and  
4        means for populating an associated content-addressable memory with a  
5        plurality of indices of said plurality of multi-feature packet processing  
6        rules in said multi-feature classification memory.

1        25. The network element of claim 24, further comprising:  
2        means for identifying a classification of said packet; and  
3        means for using said classification to identify said multi-feature packet  
4        processing rule.

1        26. The network element of claim 25, wherein said classification is based  
2 on a plurality of parameters of said packet.

1        27. The network element of claim 25, further comprising:  
2        means for receiving said packet;  
3        means for finding a match for said classification in said associated content-  
4        addressable memory; and  
5        means for receiving one of said indices from said associated content-  
6        addressable memory for one of said multi-feature packet processing  
7        rules in said multi-feature classification memory.

1        28. The network element of claim 27, further comprising:  
2        means for using said index to receive said multi-feature packet processing rule  
3        from said multi-feature classification memory.

1        29. The network element of claim 27, wherein said content-addressable  
2 memory is a multi-feature content addressable memory.

1       30. The network element of claim 27, wherein said content-addressable  
2 memory is a feature based content-addressable memory bank.

1       31. The network element of claim 30, wherein said multi-feature packet  
2 processing rules are populated in said multi-feature classification memory according  
3 to a feature hierarchy.

1       32. A network element comprising:  
2           means for identifying a classification of said packet; and  
3           means for locating a multi-feature packet processing rule in a multi-feature  
4                   classification memory using said classification.

1       33. The network element of claim 32, further comprising:  
2           means for processing said packet according to said multi-feature packet  
3                   processing rule.

1       34. The network element of claim 32, wherein said classification is based  
2 on a plurality of parameters of said packet.

1       35. The network element of claim 33, further comprising:  
2           means for receiving said packet;  
3           means for finding a match for said classification in a content-addressable  
4                   memory; and  
5           means for receiving an index from said content-addressable memory for said  
6                   multi-feature packet processing rule in said multi-feature classification  
7                   memory.

1       36. The network element of claim 35, further comprising:  
2           means for using said index to receive said multi-feature packet processing rule  
3                   from said multi-feature classification memory.

1       37. The network element of claim 35, wherein said content-addressable  
2 memory is a multi-feature content addressable memory.

1       38.    The network element of claim 35, wherein said content-addressable  
2 memory is a feature based content-addressable memory bank.

1       39.    The network element of claim 35, wherein said multi-feature packet  
2 processing rules are populated in said multi-feature classification memory according  
3 to a feature hierarchy.

1       40.    A computer program product for processing a packet, encoded in  
2 computer readable media, said program product comprising a set of instructions  
3 executable on a computer system, said set of instructions is configured to  
4            populate a plurality of multi-feature packet processing rules in a multi-feature  
5            classification memory; and  
6            populate an associated content-addressable memory with a plurality of indices  
7            of said plurality of multi-feature packet processing rules in said multi-  
8            feature classification memory.

1       41.    The computer program product of claim 40, wherein said set of  
2 instructions is further configured to:  
3            identify a classification of said packet; and  
4            use said classification to identify said multi-feature packet processing rule.

1       42.    The computer program product of claim 41, wherein said classification  
2 is based on a plurality of parameters of said packet.

1       43.    The computer program product of claim 41, wherein said set of  
2 instructions is further configured to:  
3            receive said packet;  
4            find a match for said classification in said associated content-addressable  
5            memory; and  
6            receive one of said indices from said associated content-addressable memory  
7            for one of said multi-feature packet processing rules in said multi-  
8            feature classification memory.

1       44. The computer program product of claim 43, wherein said set of  
2 instructions is further configured to:

3           use said index to receive said multi-feature packet processing rule from said  
4           multi-feature classification memory.

1       45. The computer program product of claim 43, wherein said content-  
2 addressable memory is a multi-feature content addressable memory.

1       46. The computer program product of claim 43, wherein said content-  
2 addressable memory is a feature based content-addressable memory bank.

1       47. The computer program product of claim 46, wherein said multi-feature  
2 packet processing rules are populated in said multi-feature classification memory  
3 according to a feature hierarchy.

1       48. A computer program product for processing a packet, encoded in  
2 computer readable media, said program product comprising a set of instructions  
3 executable on a computer system, said set of instructions is configured to  
4           identify a classification of said packet; and  
5           locate a multi-feature packet processing rule in a multi-feature classification  
6           memory using said classification.

1       49. The computer program product of claim 48, wherein said set of  
2 instructions is further configured to:  
3           processing said packet according to said multi-feature packet processing rule.

1       50. The computer program product of claim 48, wherein said classification  
2 is based on a plurality of parameters of said packet.

1        51. The computer program product of claim 49, wherein said set of  
2 instructions is further configured to:  
3            receive said packet;  
4            find a match for said classification in a content-addressable memory; and  
5            receive an index from said content-addressable memory for said multi-feature  
6            packet processing rule in said multi-feature classification memory.

1        52. The computer program product of claim 51, wherein said set of  
2 instructions is further configured to:  
3            use said index to receive said multi-feature packet processing rule from said  
4            multi-feature classification memory.

1        53. The computer program product of claim 51, wherein said content-  
2 addressable memory is a multi-feature content addressable memory.

1        54. The computer program product of claim 51, wherein said content-  
2 addressable memory is a feature based content-addressable memory bank.

1        55. The computer program product of claim 51, wherein said multi-feature  
2 packet processing rules are populated in said multi-feature classification memory  
3 according to a feature hierarchy.